Sections 7-7 and 7-8: Rational Exponents

How do you work with rational exponents?

What happens when the numerator in the exponent is not equal to 1?

$16^{3/4}$ ← This can be done on a calculator, but we need to understand what is going on before we can just do it, so let's take a look:

$16^{3/4} =$

Rational Exponent Theorem:

You can find either the power or the root first

→ You ***must*** show 2 steps unless you are told to approximate.

Example 1: Simplify $36^{3/2}$.

Example 2: Approximate $16^{3/5}$ to the nearest thousandth.

Exploration: Find 25^1 and 25^2.

Where is $25^{3/2}$ in relation to these two values?

***When the exponent is between two other powers with the same base, the result will also be between the two others.

Example 3: List in order from smallest to largest: $6^{2}, 6^{4/3}, 6^{1}, 6^{3/2}, 6^{3}$

Example 4: Solve $x^{5/4} = 243$.

***Be careful here. We might be taking an even root of a number, and this is going to bring up a special case. Let's take –3:

$$\sqrt{(-3)^{2}} = \sqrt{9} = 3 \neq -3$$

This comes from the square root-absolute value theorem: $\sqrt{x^{2}} = |x|$

So $x^{4/6} = |x|^{2/3}$. We can still simplify the rational exponent, but we need to realize that *x* must be positive.

Example 5: Simplify $25^{-3/2}$.

***We are looking at the same process as the *Rational Exponent Theorem*.

→

There are so many possibilities! What should you do first?!?

*Negative Exponent →

*Root →

*Exponent > 1 →

Example 2: Solve $x^{-2/5} = 9$.

Let's look at another way of solving $x^{-2/5} = 9$.

Choose a way to solve it and make sure you follow through all the steps.
Remember to use the all the possible properties of powers!

Homework:

"If we attend continually and promptly to the little that we can do, we shall ere long be surprised to find how little remains that we cannot do." - Samuel Butler